REMARKS

This Amendment is filed in response to the Office Action dated March 30, 2011. For the following reasons this application should be allowed and the case passed to issue. No new matter is introduced by this Amendment. The amendments to claims 1 and 16 are supported by originally filed claims 5 and 7. Claims 6 and 19 are amended to correct informalities. Claims 26 and 27 are amended to maintain proper dependency.

Claims 1, 4, 6, 8, 9, 16, 17, 19, 22, and 25-27 are pending in this application. Claims 1, 4-9, 16-22, and 25-27 have been rejected. Claims 1, 6, 16, 19, 26, and 27 are amended in this response. Claims 5, 7, 18, 20, and 21 are canceled in this response. Claims 2, 3, 10-15, 23, and 24 were previously canceled.

Interview Summary

Applicants greatly appreciate the courtesy of Examiner Lee in granting a telephone interview with the undersigned on June 20, 2011. During the interview, the undersigned proposed adding the limitations of claims 5 and 7 to claim 1. The undersigned further proposed amending claim 7 to recite a "polyacrylic acid derivative." The Examiner indicated that further consideration would required upon filing a written response.

Support for Polyacrylic Acid Derivative

Original claim 7 recited "a polyacrylic acid derivative." The Examiner rejected claim 7 as being indefinite because of the word "derivative" in the Office Action mailed May 3, 2007. Applicants subsequently deleted "derivative" in the Amendment filed July 16, 2007, and the Examiner withdrew this ground of rejection in the Office Action mailed August 22, 2007. Upon further review of the originally filed specification it is clear that "polyacrylic acid derivative" is not indefinite as used in the present claims.

The present specification teach that the resin binder includes polyacrylic acid derivatives in paragraphs [0043] and [0044], and discloses an example of a polyacrylic acid derivative, Zeon BM720H (see Example 1, paragraph [0061]). Zeon BM720H comprises polyacrylonitrile (PAN) (Suzuki et al. US 2006/0194116, at paragraphs [0102], [0145], [0222], [0284], and [0332] teach Zeon BM-720H includes PAN) (Appendix 1). PAN, however, does not have carboxyl groups (see structure of PAN in the attached Wikipedia printout en.wikipedia.org/wiki/Polyacrylonitrile) (Appendix 2) and compare with structure of polyacrylic acid in the attached Wikipedia printout en.wikipedia.org/wiki/Polyacrylic_acid (Appendix 3)), and thus, possibly would not be considered a polyacrylic acid. Therefore, in view of the present originally-filed disclosure it is more correct for the claims to recite "polyacrylic acid derivative."

Although, it does not contain carboxyl or ester groups, PAN is considered a polyacrylate by those of ordinary skill in this art, along with polyacrylic acid, polymethyl methacrylate, and polyacrylamide (see attached web page printouts: en.wikipedia.org/wiki/Polyacrylate (Appendix 4) and pslc.ws/macrog/acrylate.htm (Appendix 5)). One of ordinary skill in the chemical arts would know that a "derivative" is a compound that can be imagined to arise from another compound, if one atom is replaced with another atom or a group of atoms (see attached web page printouts: dictionary.sensagent.com/DERIVATIVE%20CHEMISTRY/en-en (Appendix 6) and www.chemicool.com/definition/derivative.html (Appendix 7)). For example, although PAN is formed by polymerizing acrylonitrile, it could be imagined to have been formed from polyacrylic acid by replacing the carboxyl group (COOH) with the nitrile group (CN). Furthermore, nitriles are recognized as derivatives of carboxylic acids in the chemical arts (see attached web page printout www.britanica.com/EBchecked/topic/95281/carboxylic-acid-derivative (Appendix 8)). Therefore, polyacrylonitrile is properly a polyacrylic acid derivative, as used in the present

application. In view of the evidence presented herein, one of ordinary skill in this art would find the term "a polyacrylic acid derivative" as used in the present application is definite to one of ordinary skill in this art in accordance with the requirements of 35 U.S.C. § 112, second paragraph.

Claim Rejections Under 35 U.S.C. § 112

Claims 6 and 9 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite because of the term "fine," which modifies the resin particles. This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested.

Claims 6 and 9 have been amended to address the asserted informalities. Applicants submit that the present claims fully comport with the requirements of 35 U.S.C. § 112.

Claim Rejections Under 35 U.S.C. §§ 102/103

Claims 1, 4, 5, 8, 16-18, and 21-27 were rejected under 35 U.S.C. § 102(b) as anticipated by, or in the alternative, under 35 U.S.C. § 103(a) as obvious over Gozdz et al. (US 5,571,634), as evidenced by Hubbard (*Encyclopedia of Surface and Colloid Science*, vol. 4: Por-Z, 4397-98 (2002)). This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested. The following is a comparison between the present invention, as claimed, and cited prior art.

The Office Action found that Gozdz et al. disclose a secondary battery comprising a positive electrode, negative electrode, porous electron-insulating layer adhered to a surface of the positive or negative electrode, and an electrolyte, wherein the porous electron-insulating layer comprises fumed alumina and a resin binder. The Office Action found that the fumed alumina would have a roughly globular structure formed of extremely small particles partly fused into a relatively short, highly-branched aggregate framework based on the teaching of Hubbard.

The claimed secondary battery is not anticipated or rendered obvious by Gozdz et al. as evidenced by Hubbard at least because Gozdz et al. do not disclose or suggest the porous electron-insulating layer comprises a particulate filler and a resin binder, and the particulate filler substantially comprises an indefinite-shape particle, comprising a plurality of single crystalline particles, which has the shape of dendrites, grape clusters, or coral, the shape having a neck, wherein the neck is formed between and joins at least a pair of the single crystalline particles, the neck comprising the same material as the single crystalline particles, wherein the porous electron-insulating layer has a porosity of 50% or more, and the indefinite-shape particles maintain their shape when subjected to a shearing force to disperse the particles in a liquid component to form a slurry, wherein the indefinite-shape particle comprises a metal oxide, and the resin binder comprises a polyacrylic acid derivative, as required by claim 1; and a porous electron-insulating layer comprises a particulate filler and a resin binder, the particulate filler substantially comprises indefinite-shape particles, wherein the indefinite-shape particles are polycrystalline particles comprising a plurality of single crystalline particles that are diffusion bonded to each other, and a neck is formed between at least a pair of the single crystalline particles, the neck comprising the same material as the single crystalline particles, wherein the porous electron-insulating layer has a porosity of 50% or more, the indefinite-shape particles comprise a metal oxide, and the resin binder comprises a polyacrylic acid derivative, as required by claim 16.

Gozdz et al. do not disclose or suggest the binder is a polyacrylic acid derivative.

The present claims are further distinguishable because Gozdz et al. disclose using 10-70% on a polymer basis of a finely-divided inorganic filler (col. 2:50-57). In Example 1, Gozdz

et al. use 4 g of filler per 6 g of polymer. At such a high weight ratio of polymer to silica a porosity of 50% or more cannot be obtained.

Claims 1 and 16 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Delnick (US 5,948,464) in view of Gozdz et al., as evidenced by Hubbard. This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested.

The combination of Delnick and Gozdz et al., as evidenced by Hubbard, does not suggest the claimed secondary battery because Delnick does not cure the deficiencies of Gozdz et al., as evidenced by Hubbard. Delnick does not suggest the binder is a polyacrylic acid derivative and that the porous electron-insulating layer has a porosity of 50% or more, as required by claims 1 and 16.

Claims 7 and 20 are rejected under 35 U.S.C. § 103(a) as obvious over Delnick in view of Gozdz et al., as evidenced by Hubbard and further in view of Waterhouse (US 4,363,856). This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested.

Initially, this rejection is moot, as claims 7 and 20 are canceled in this response. However, the limitations of claims 7 and 20 were added to claims 1 and 16, respectively. Therefore, this rejection will be addressed.

The Office Action acknowledged that Delnick modified by Gozdz et al. do not disclose the resin binder comprises a polyacrylic acid derivative. The Office Action relied on the Waterhouse teaching of acrylic acid as a binder in a separator to conclude that it would have been obvious to substitute acrylic acid as a binder into the separator of Delnick because the selection of a known material based on the suitability for its intended use is obvious.

Delnick, Gozdz et al., and Waterhouse, whether taken in combination, or taken alone, do not render obvious the claimed secondary batteries because Waterhouse does not cure the

deficiencies of Delnick and Gozdz et al. Waterhouse does not disclose or suggest the porous electron-insulating layer comprises a particulate filler and a resin binder, and the particulate filler substantially comprises an indefinite-shape particle, comprising a plurality of single crystalline particles, which has the shape of dendrites, grape clusters, or coral, the shape having a neck, wherein the neck is formed between and joins at least a pair of the single crystalline particles, the neck comprising the same material as the single crystalline particles, wherein the porous electron-insulating layer has a porosity of 50% or more, and the indefinite-shape particles maintain their shape when subjected to a shearing force to disperse the particles in a liquid component to form a slurry, wherein the indefinite-shape particle comprises a metal oxide, and the resin binder comprises a polyacrylic acid derivative, as required by claim 1; and a porous electron-insulating layer comprises a particulate filler and a resin binder, the particulate filler substantially comprises indefinite-shape particles, wherein the indefinite-shape particles are polycrystalline particles comprising a plurality of single crystalline particles that are diffusion bonded to each other, and a neck is formed between at least a pair of the single crystalline particles, the neck comprising the same material as the single crystalline particles, wherein the porous electron-insulating layer has a porosity of 50% or more, the indefinite-shape particles comprise a metal oxide, and the resin binder comprises a polyacrylic acid derivative, as required by claim 16.

Although Waterhouse teaches the use of polyacrylic acid derivatives as a resin binder, it would not have been obvious to combine the teachings of Waterhouse with Delnick and Gozdz et al. because Waterhouse is directed to a completely different battery type than Gozdz et al. and Delnick. For example, Gozdz et al. is directed to lithium ion secondary batteries. Waterhouse, on the other hand, is directed to lead-acid secondary batteries (see col. 1:50-55). As one of

ordinary skill in this art would know, the battery components have to be compatible with the battery electrolyte. Lead-acid batteries contain an aqueous acid electrolyte. As one of ordinary skill in this art would know, an aqueous acid electrolyte would not be used in a lithium ion battery because aqueous acid is incompatible with the lithium-based electrodes. Therefore, there would be no motivation to select the polyacrylic acid derivative binder of Waterhouse, which is designed to be compatible in an aqueous acid environment for use in the battery of Delnick and Gozdz et al.

Claim 9 was rejected under 35 U.S.C. § 103(a) as obvious over Delnick in view of Gozdz et al., as evidenced by Hubbard, and further in view of Yu (US 6,080,507). This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested.

The combination of Delnick, Gozdz et al., and Yu does not suggest the claimed secondary battery because Yu does not cure the deficiencies of Delnick and Gozdz et al. Yu does not disclose or suggest the porous electron-insulating layer comprises a particulate filler and a resin binder, and the particulate filler substantially comprises an indefinite-shape particle, comprising a plurality of single crystalline particles, which has the shape of dendrites, grape clusters, or coral, the shape having a neck, wherein the neck is formed between and joins at least a pair of the single crystalline particles, the neck comprising the same material as the single crystalline particles, wherein the porous electron-insulating layer has a porosity of 50% or more, and the indefinite-shape particles maintain their shape when subjected to a shearing force to disperse the particles in a liquid component to form a slurry, wherein the indefinite-shape particle comprises a metal oxide, and the resin binder comprises a polyacrylic acid derivative, as required by claim 1; and a porous electron-insulating layer comprises a particulate filler and a resin binder, the particulate filler substantially comprises indefinite-shape particles, wherein the

indefinite-shape particles are polycrystalline particles comprising a plurality of single crystalline particles that are diffusion bonded to each other, and a neck is formed between at least a pair of the single crystalline particles, the neck comprising the same material as the single crystalline particles, wherein the porous electron-insulating layer has a porosity of 50% or more, the indefinite-shape particles comprise a metal oxide, and the resin binder comprises a polyacrylic acid derivative, as required by claim 16.

Claim 9 is further distinguishable, because as disclosed in an example in the present specification, a relatively thin separator of 15 μm paired with 5 μm heat-resistant layers (paras. [0072] and [0073]) provides superior performance at low temperature (0 °C) and high discharge rate (2C) (see Table 2). Delnick, on the other hand, disclose examples with much thicker separators. The thickness of Delnick separator (which corresponds to the heat-resistant layer of the present invention) is exemplified as 55 μm, 97 μm, and 77 μm (Examples 1, 2, and 3), which is extremely thick. Further, there is no suggestion of the claimed porosity, or any effect of porosity on low-temperature, high-rate discharge in Delnick or Gozdz et al.

Obviousness can be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge readily available to one of ordinary skill in the art. *In re Kotzab*, 217 F.3d 1365, 1370 55 USPQ2d 1313, 1317 (Fed. Cir. 2000); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992); *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988). There is <u>no</u> suggestion in Delnick, Gozdz et al., Waterhouse and Yu to modify the battery of Delnick and Gozdz et al. so that the porous electron-insulating layer comprises a particulate filler and a resin binder, and the particulate filler substantially comprises an indefinite-shape particle, comprising a plurality of single crystalline

particles, which has the shape of dendrites, grape clusters, or coral, the shape having a neck, wherein the neck is formed between and joins at least a pair of the single crystalline particles, the neck comprising the same material as the single crystalline particles, wherein the porous electron-insulating layer has a porosity of 50% or more, and the indefinite-shape particles maintain their shape when subjected to a shearing force to disperse the particles in a liquid component to form a slurry, wherein the indefinite-shape particle comprises a metal oxide, and the resin binder comprises a polyacrylic acid derivative, as required by claim 1; and a porous electron-insulating layer comprises a particulate filler and a resin binder, the particulate filler substantially comprises indefinite-shape particles, wherein the indefinite-shape particles are polycrystalline particles comprising a plurality of single crystalline particles that are diffusion bonded to each other, and a neck is formed between at least a pair of the single crystalline particles, the neck comprising the same material as the single crystalline particles, wherein the porous electron-insulating layer has a porosity of 50% or more, the indefinite-shape particles comprise a metal oxide, and the resin binder comprises a polyacrylic acid derivative, as required by claim 16.

~~The only teaching of the claimed secondary batteries is found in Applicants' disclosure.~~ However, the teaching or suggestion to make a claimed combination and the reasonable expectation of success must <u>not</u> be based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

The dependent claims are allowable for at least the same reasons as the independent claims from which they depend, and further distinguish the claimed secondary batteries.

In view of the above amendments and remarks, Applicants submit that this application should be allowed and the case passed to issue. If there are any questions regarding this

Amendment or the application in general, a telephone call to the undersigned would be appreciated to expedite the prosecution of the application.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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